What is claimed is:

1. A method for etching a dielectric layer overlying an integrated circuit or electronic packaging substrate, comprising:

(a) providing an integrated circuit substrate having a dielectric layer thereon;

(b) over the dielectric layer, depositing coating layer of an organic antireflective hard mask composition that comprises one or more inorganic elements selected from Group IIIa, IVa, Va, VIa, VIIa, VIII, Ib, IIb, IIIb, IVb or Vb of the Periodic Table;

(c) depositing a coating layer of a photoresist composition over the antireflective hard mask composition coating layer;

(d) exposing to patterned radiation and developing the photoresist composition coating layer to form to form a photoresist relief image over the antireflective hard mask composition;

(e) etching the antireflective hard mask composition to form a relief image thereof; and

(f) etching bared dielectric layer areas.

2. The method of claim 1 wherein the antireflective hard mask composition contains at least about 20 mole percent of carbon and at least about 1 mole percent of inorganic atoms, based on total solids of the composition.

3. The method of claim 1 wherein the antireflective hard mask composition has about 5 mole percent of inorganic atoms, based on total solids of the composition.

4. The method of claim 1 wherein the inorganic atoms of the antireflective hard mask composition are selected from the group consisting of Si, Al and Ge.

5. The method of claim 1 wherein the antireflective hard mask composition is deposited by spin coating.

6. The method of claim 1 wherein the antireflective hard mask composition comprises a component that has aromatic groups.

7. The method of claim 6 wherein the aromatic groups are carbocyclic aryl groups.

8. The method of claim 6 wherein the aromatic groups are optionally substituted anthracenyl groups, optionally substituted naphthyl groups or optionally substituted phenyl groups.

9. The method of claim 1 wherein the photoresist composition is imaged with radiation having a wavelength of about 248 nm, and the antireflective hard mask composition comprises a component that has optionally substituted anthracene groups or optionally substituted naphthyl groups.

10. The method of claim 1 wherein the photoresist composition is imaged with radiation having a wavelength of about 193 nm, and the antireflective hard mask composition comprises a component that has optionally substituted phenyl groups.

11. The method of claim 1 wherein the dielectric layer is etched with a plasma containing oxygen.

12. The method of claim 1 wherein the antireflective hard mask composition layer is etched with a halide plasma.

13. The method of claim 1 wherein the antireflective hard mask layer is at least about three times less reactive to an oxygen plasma etch than the dielectric layer.

14. The method of claim 1 wherein the antireflective hard mask composition comprises a thermal acid generator compound.

15. The method of claim 1 wherein the antireflective hard mask composition is thermally cured prior to applying the photoresist composition layer.

16. The method of claim 1 wherein the antireflective hard mask composition comprises a photoacid generator, and the photoacid generator is not substantially activated until the exposing of the photoresist composition layer.

17. The method of claim 1 wherein the antireflective hard mask composition comprises a crosslinker material.

18. A method for etching a dielectric layer overlying an integrated circuit or electronic packaging substrate, comprising:

(a) providing a substrate having a dielectric layer thereon;

(b) over the dielectric layer, depositing a coating layer of an organic antireflective hard mask composition that is at least about three times less reactive to an oxygen plasma etch than the dielectric layer;

(c) depositing a coating layer of a photoresist composition over the antireflective hard mask composition coating layer;

(d) exposing to patterned radiation and developing the photoresist composition coating layer to form to form a photoresist relief image over the antireflective hard mask composition;

(e) etching the antireflective hard mask composition to form a relief image thereof; and

(f) etching bared dielectric layer areas.

19. The method of claim 18 wherein the antireflective hard mask composition is at least about 5 times less reactive to an oxygen plasma than the dielectric composition layer.

20. The method of claim 19 wherein the antireflective hard mask layer is etched with a halide plasma.

21. A coated substrate comprising:

a substrate having a dielectric layer thereon;

over the dielectric layer, a coating layer of an organic antireflective hard mask composition that comprises one or more inorganic elements selected from Group IIIa, IVa, Va, VIa, VIIa, VIII, Ib, IIb, IIIb, IVb or Vb of the Periodic Table; and

over the antireflective hard mask composition coating layer, a coating layer of a photoresist composition.

22. A coated substrate comprising:

a substrate having a dielectric layer thereon;

over the dielectric layer, a coating layer of an organic antireflective hard mask composition; and

over the antireflective hard mask composition coating layer, a coating layer of a photoresist composition.

23. An antireflective hard mask composition for use with an overcoated photoresist layer, comprising:

at least about 20 mole percent of carbon and at least about 1 mole percent of Si, Ge or Al atoms, based on total solids of the composition, and an organic chromophore that can absorb exposure radiation used to pattern the overlying photoresist layer.